

AMENDMENTS TO THE CLAIMS:

This listing of claims replaces all prior versions and listings of claims in the application:

LISTING OF THE CLAIMS:

1. (Currently Amended) A data transmission apparatus ~~used for use~~ in a multiple service ring ~~including comprising~~ at least two nodes ~~coupled electrically connected~~ to at least one aggregate pipe and ~~to~~ at least one tributary, said data transmission apparatus comprising:

a tributary receiving (RX) framer ~~coupled electrically connected~~ to a tributary, ~~the tributary RX framer~~ for deframing data frames received from said tributary and ~~for~~ extracting a destination node ~~addresses from received data frames~~ address;

a transmitting (TX) framer for encapsulating ~~the~~ destination node ~~address~~ addresses and ~~the~~ data received from the tributary into data frames ~~of for~~ the multiple service ring and ~~for~~ transmitting the ~~same data frames for the multiple service ring~~ along an aggregate pipe to a downstream neighbor node in the multiple service ring;

a RX framer for receiving, and ~~for~~ deframing, data frames ~~of from~~ the multiple service ring from a ~~an~~ upstream neighbor node along an aggregate pipe ~~of the multiple service ring~~ to obtain at least a destination node ~~addresses~~ address and ~~actual~~ data;

a filter for determining data frames for a local node ~~according to~~ based on at least one obtained the destination node address, and ~~for~~ forwarding the other data frames ~~that are not for~~

the local node to said TX framer so as to forward ~~the other frames~~ to a next another node of the multiple service ring;

a tributary TX framer for encapsulating ~~said~~ data frames for the local node into tributary data frames and for sending the tributary data frames to a corresponding tributary;

wherein ~~each~~ at least one aggregate pipe ~~comprises a~~ in the multiple service ring has an N-ring structure comprised consisting of N-M unidirectional ringlets and M unidirectional counter-rotating ringlets, where N and M are integers and $1 \leq M < N$; and

a ring management unit for controlling use of ringlets in the at least one aggregate pipe,
wherein controlling use of ringlets comprises assigning an (n-1)-th ringlet to transport data
packets in a unidirectional direction and an n-th ringlet to transport control packets in a direction
opposite to the unidirectional direction, where $1 < n \leq N$.

2 and 3. (Canceled)

4. (Currently Amended) The data transmission apparatus according to claim 1 [[3]],
wherein said n-th ringlet ~~as a control channel of (n-1)-ringlet~~ comprises is also set default as a
protection channel ~~of for the (n-1)th ringlet in the case of fibre facility failure of,~~ or signal
degradation of, the (n-1)th ringlet.

5. (Currently Amended) The data transmission apparatus according to claim 1, further
comprising a ~~tributary identifier setting-up~~ means for setting-up an identifier for use in

~~identifying an~~ indicating the originating tributary, and said wherein the tributary identifier are is
encapsulated together with the a destination node address and the data received from the
tributary ~~into~~ in at least one data frame for frames of the multiple service ring.

6. (Currently Amended) The data transmission apparatus according to claim 5, further
comprising ~~a tributary determining~~ means for determining ~~the a~~ tributary type and ~~a tributary No-~~
number from at least one of the data frames for a local node, so as to send said for use in sending
tributary data frames to ~~a the~~ corresponding tributary.

7. (Currently Amended) The data transmission apparatus according to claim 6, wherein
~~said data frames of the MSR~~ multiple service ring comprise are FE/GE/10GE MAC frames.

8. (Currently Amended) The data transmission apparatus according to claim 7, further
comprising a CWDM/DWDM (Coarse Wavelength Division Multiplex/ Dense Wavelength
Division Multiplex) unit for ~~transmission of transmitting~~ multiple aggregates, wherein:

for the CWDM, ~~the an aggregate will be comprises~~ FEs, GEs FE, GE and 10GE frames,
~~and be operated where~~ at N=4, 8, or 16 4/8/16; and

for the DWDM, ~~the aggregate is an aggregate comprises~~ 10GE frames with using Wide
Interface sublayer – SONET (Synchronous Optical Network) transmission, or using comprises
GE and FE frames using an STM-16/OC-48 channel (into DWDM) in which STM-16/OC-48

carries GEs and FEs, and ringlet number, wherein, for DWDM, N[[,]] can be up to is at most 1024.

9. (Canceled)

10. (Currently Amended) The data transmission apparatus according to claim 1, wherein each aggregate pipe includes pipes in the multiple service ring comprise link and broadcast topologies.

11. (Currently Amended) A data transmission method used in with a multiple service ring including that comprises at least two nodes coupled electrically connected to at least one aggregate pipe and to at least one tributary, said method comprising: the steps of:

(A) for data frames from a tributary: [[,]]

receiving and the data frames from the tributary;

deframing data frames received from said tributary; and

extracting a destination node addresses from received data frames address; and

encapsulating the extracted destination node address addresses and the data received from the tributary into data frames of for the multiple service ring; and

transmitting the same data frames for the multiple service ring
along an aggregate pipe to a downstream neighbor node in the multiple
service ring; and
and (B) for data frames from a upstream neighbor node that is upstream along an
aggregate pipe in the multiple service ring;[[,]]

receiving data frames from the upstream neighbor node;
and deframing received data frames of the multiple service ring
from the upstream neighbor node along the aggregate pipe to obtain at
least a destination node address addresses and actual data;
determining data frames for a local node according to based on at
least one obtained the destination node address; and
forwarding the other data frames that are not for the local node to a
next another node of the multiple service ring; and
encapsulating said data frames for the local node into tributary data
frames; and
sending the tributary data frames to a corresponding tributary;[[,]]
wherein each at least one aggregate pipe in the multiple service ring has an comprises a
N-ring structure consisting comprised of N-M unidirectional ringlets and M unidirectional
counter-rotating ringlets, where N and M are integers and $1 \leq M < N$; and
wherein the method further comprises controlling use of ringlets in the at least one
aggregate pipe, wherein controlling use of ringlets comprises assigning an (n-1)-th ringlet to

transport data packets in a unidirectional direction and an n-th ringlet to transport control packets in a direction opposite to the unidirectional direction, where $1 < n \leq N$.

12 and 13. (Canceled)

14. (Currently Amended) The data transmission method according to claim ~~11~~ 13, wherein said n-th ringlet ~~as a control channel of (n-1) ringlet is also set default as~~ comprises a protection channel ~~of for the~~ (n-1)th ringlet in the case of ~~fibre facility~~ failure ~~of~~, or signal degradation of, ~~the~~ (n-1)th ringlet.

15. (Currently Amended) The data transmission method according to claim 11, wherein, for data frames from the a neighbor node that is upstream ~~neighbor node~~, said method further comprises:

~~the step of~~ setting-up an identifier for ~~indicating the use in~~ identifying an originating tributary, ~~and wherein said tributary the identifier are is encapsulated together with a the~~ destination node address and the data received from the tributary ~~into frames in at least one data frame~~ of the multiple service ring.

16. (Currently Amended) The data transmission method according to claim 15, further comprising ~~a step of~~ determining the a tributary type and tributary ~~No. number~~ from at least one

~~of~~ the data frames for ~~a~~ local node; ~~so as to send said~~ for use in sending tributary data frames to ~~a~~
~~the~~ corresponding tributary.

17. (Currently Amended) The data transmission method according to claim 16, wherein
~~said~~ data frames of the ~~MSR~~ are multiple service ring comprise FE/GE/10GE MAC frames.

18. (Currently Amended) The data transmission method according to claim 17, wherein
multiple aggregates are ~~transmitted using~~ used for CWDM/DWDM (Coarse Wavelength
Division Multiplex/ Dense Wavelength Division Multiplex), wherein:

for ~~the~~ CWDM, ~~the~~ an aggregate ~~will be~~ FEs, GEs comprises FE, GE, and 10GE frames,
~~and be operated at where~~ N=4, 8 or 16 ~~4/8/16; and~~

for ~~the~~ DWDM, ~~the~~ an aggregate ~~is~~ comprises 10GE frames using ~~with~~ Wide Interface
sublayer- SONET (Synchronous Optical Network) transmission, or using comprises GE and FR
frames using an STM-16/OC-48 channel (~~into DWDM~~) ~~in which STM-16/OC-48 carries GEs~~
~~and FEs, and ringlet number,~~ wherein, for DWDM, N, can be up to is at most 1024.

19. (Canceled)

20. (Currently Amended) The data transmission method according to claim 11, wherein
~~each~~ aggregate ~~pipe includes~~ pipes in the multiple service ring comprise link and broadcast
topologies.

21. (Currently Amended) The data transmission apparatus according to claim 1 [[3]], wherein one of the N ringlets ~~is set as~~ comprises a protection channel for ~~the other~~ at least one other of the N ringlets.

22. (Currently Amended) The data transmission method according to claim 11 [[13]], wherein one of the N ringlets ~~is set as~~ comprises a protection channel for ~~the other~~ at least one other of the N ringlets.